

REMARKS

I. Status of the Claims

Claims 16-30 are pending in this application. Claims 16, 29, and 30 have been amended to recite that there is "no appreciable cross-linking." This means the polymer retains its thermoplastic properties and is recyclable under standard recycling methods. Support for this amendment is found in the specification, for example, at pages 6 and 20. Accordingly, no new matter has been added.

II. Rejection Under 35 U.S.C. §§ 102(e)/103(a)

The Examiner has rejected claims 16-30 under 35 U.S.C. § 102(e), as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,707,732 ("Sonoda et al.") in view of U.S. Patent No. 6,262,161 ("Betso et al.") for the reasons given at pages 3-5 of the Office Action.¹ Applicants respectfully traverse this rejection for at least the reasons presented below.

A rejection under Section 102 is proper only when the claimed subject matter is identically described or disclosed in the prior art. In re Arkley, 455 F.2d 586, 587 (C.C.P.A. 1972). "For anticipation under 35 U.S.C. § 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly." M.P.E.P. § 706.02.

In the present case, Sonoda et al. fails to disclose each and every limitation of Applicants' claimed invention, either expressly or inherently. In particular, Sonoda et al. fails at least to disclose (1) natural magnesium hydroxide, (2) hydrolyzable organic silane groups grafted onto the polymer chain for compatibilization of the natural

¹ Applicants recognize that the Office has withdrawn the original rejection over Section 102(e) in favor a similar rejection over Sections 102(e)/103(a). Yet, the Office does not address how Section 103(a) applies with respect to Sonoda et al. alone.

magnesium hydroxide with the polymeric components, and (3) no appreciable cross-linking, as recited by Applicants' claims. Accordingly, Applicants maintain that Sonoda et al. fails to anticipate the present claims.

A. Natural magnesium hydroxide

1. Sonoda et al. does not expressly teach the use of Natural magnesium hydroxide

Applicants maintain that Sonoda et al.'s vague disclosure of "conventional off-the-shelf magnesium hydroxide" fails to anticipate the presently claimed natural magnesium hydroxide. In the present case, the term "natural magnesium hydroxide" according to the present invention refers to "magnesium hydroxide obtained by grinding minerals based on magnesium hydroxide, such as brucite and the like." See specification at page 11, line 34 - page 12, line 2.

First, a species is anticipated if one of ordinary skill in the art is able to "at once envisage" the specific species within the disclosed genus. See e.g., M.P.E.P.

§2131.02. One of ordinary skill in the art would not be able to "at once envisage" such magnesium hydroxide from Sonoda et al.'s mere recitation of a genus as undefined as "conventional off-the-shelf magnesium hydroxide." See M.P.E.P. § 2131.02 (citing Akzo N.V. v. International Trade Comm'n, 808 F.2d 1471, 1 U.S.P.Q.2d 1241 (Fed. Cir. 1986) (Claims to a process for making aramid fibers using a 98% solution of sulfuric acid were not anticipated by a reference which disclosed using sulfuric acid solution but which did not disclose using a 98% concentrated sulfuric acid solution)).

Second, one may look to the preferred embodiments to determine which compounds can be anticipated. *Id.*, (citing In re Petering, 301 F.2d 676, 133 U.S.P.Q. 275 (CCPA 1962) (disclosing specific preferences for the chemical groups to a generic

chemical formula and holding that the limited number of compounds covered by the preferred formula enables one skilled in the art to “at once envisage each member of this limited class”, thus anticipates applicant's claims)). Here, Sonoda et al.'s preferred embodiments explicitly teach the use of synthetic magnesium hydroxide. There is no suggestion of natural magnesium hydroxide.

Third, as explained in Applicants' specification, one of ordinary skill in the art would not have expected natural magnesium hydroxide to be suitable with the polymers of the claims. Specifically, the specification explains that one of ordinary skill in the art would expect that natural magnesium hydroxide would have a low affinity with polymers of low polarity such as used in the claims, and the impurities of the natural magnesium hydroxide degrade these polymer. See specification at 2. It was only Applicants that made the unexpected discovery that natural magnesium hydroxide is suitable with the specific polymers of the claims when hydrolyzable silane groups are grafted onto the polymer. See specification at 25-27. Thus, a person of ordinary skill in the art would not envisage Sonoda et al.'s disclosure as encompassing a product that would be expected to fail.

Accordingly, for at least these reasons, Applicants maintain that Sonoda et al. fails to anticipate the present claims.

In the present Office Action, the Examiner has asserted that Sonoda et al.'s failure to disclose natural magnesium hydroxide does not preclude the clear expectation that “the skilled artisan in this art should have knowledge of known commercially available magnesium hydroxides” and that “[o]ne of ordinary skill in the art is expected and presumed to know something about the art other than what a reference **literally**

teaches.” See page 9 of the present Office Action (emphasis added). That is exactly Applicants’ point. One of ordinary skill in the art would know more than what is taught by Sonoda et al. Applicants do not assert that one of ordinary skill in the art is unaware of natural magnesium hydroxide, only that in view of the teachings of the prior art, one of ordinary skill in the art would not envisage Sonoda et al.’s disclosure as a disclosure of natural magnesium hydroxide, particularly in view of its known infirmities. U.S. Patent No. 4,145,404 teaches a person of ordinary skill in the art that natural magnesium hydroxide is incompatible with low polarity polymer, such as used in the present claims. EP 0 780 425 teaches a person of ordinary skill in the art that natural magnesium hydroxide degrades the polymer matrix, such as claimed. In that light, one of ordinary skill in the art would not recognize Sonoda et al. as expressly teaching the use of natural magnesium hydroxide.

Furthermore, the Office asserted that “there is no clear factual evidence of record of either a) a materially different product or b) superior or unexpected properties that are directly related to the specific magnesium hydroxide used.” See page 10 of the present Office Action. Applicants respectfully disagree with the Office’s assertion for at least the following reasons.

First, as detailed in prior art cited above, while both natural magnesium hydroxide and synthetic magnesium hydroxide can be used as flame-retardant fillers, natural magnesium hydroxide had disadvantages that had to overcome. The Office cannot deny that only Applicants have expressly shown a mechanism of using natural magnesium hydroxide that has an affinity for the recited polymers and does not degrade

the recited polymers, which had been a well-known problem and the reason for the development of synthetic magnesium hydroxide.

Second, the Office's reliance on M.P.E.P. § 2112.01 is misplaced. See pages 10 of the present Office Action. M.P.E.P. § 2112.01 states that "[w]here the claimed and prior art products are **identical or substantially identical in structure or composition**, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established" (emphasis added). As Applicants explained above, natural magnesium hydroxide has irregular geometric shape and surface appearance, whereas synthetic magnesium hydroxide consists of uniform hexagonal crystallites. See page 13 of specification, lines 19-26. And as explained below, the organosilane in Sonoda et al. is used for crosslinking polymers and not for coupling polymers with particles. Thus, the particles differ and the compositions differ, and, thus Sonoda et al. is not "identical or substantially identical in structure or composition" to the coating/composition of the claims. Accordingly, Applicants once again respectfully submit that evidence of secondary consideration, such as unexpected results or commercial success, is irrelevant to 35 U.S.C. §102 rejections.

2. **Sonoda et al. does not inherently teach the use of Natural magnesium hydroxide**

Furthermore, the Office asserts that Sonoda et al. **inherently** teaches the use of natural magnesium hydroxide as claimed in the present invention. Office Action at 10. Applicants respectfully disagree for at least the following reasons.

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the

allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." M.P.E.P. § 2112, citing Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

Sonoda et al. discloses that "[w]hile conventional off-the-shelf magnesium hydroxide ... can be used, a **preferred** magnesium hydroxide has the following characteristics: ... (b) a crystallite size in the <101> direction of more than 800 angstroms" (emphasis added). These recited characteristics, which are relevant only to crystalline magnesium hydroxide, dictate that the preferred magnesium hydroxide is synthetic and not natural. In contrast, in the present invention's specification, it stated that "natural magnesium hydroxide has a highly irregular granular morphology in terms both of its geometrical shape and of its surface appearance." Therefore, since Sonoda et al. clearly discloses a synthetic magnesium hydroxide as a preferred choice. Thus, Sonoda et al. does not inherently teach the use of natural magnesium hydroxide because the use of natural magnesium hydroxide **does not necessarily** flow from the teachings of Sonoda et al. At best, it is a mere possibility, which Applicants submit is not the case, as discussed above.

For the foregoing reasons, Sonoda et al. does not expressly or inherently teach the use of natural magnesium hydroxide and therefore does not disclose each and every element of Applicants' present invention. Thus, Sonoda et al. fails to anticipate the present claims.

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B. Sonoda et al. does not teach the hydrolyzable organic silane limitation

Applicants maintain that Sonoda et al. does not expressly or inherently disclose hydrolyzable organic silane groups grafted onto the polymer chain for compatibilization of the natural magnesium hydroxide with the polymeric components, as presently claimed. First, as discussed above, Sonoda et al. fails to teach natural magnesium hydroxide and therefore it does not and cannot teach hydrolyzable organic silane groups for compatibilization of natural magnesium hydroxide with polymeric components as presently claimed.

Second, as detailed in Applicants' September 10, 2003 Response, Sonoda et al.'s disclosure of optionally grafting a copolymer with an alkenyl trialkoxy silane in the presence of organic peroxide **IS NOT** a disclosure of a "hydrolyzable organic silane groups grafted onto the polymer chain for compatibilization of the natural magnesium hydroxide with the polymeric components," as presently claimed. See col. 6, lines 41-44. The Office is correct that Sonoda et al. teaches grafting the copolymer with an hydrolyzable organic silane groups; however, the problem for the Office is that Sonoda et al. does not stop there.

Sonoda et al. expressly requires that its copolymers can be made **hydrolyzable** for the purpose of moisture curing. Col. 6, lines 41-42. Specifically, once they have been made hydrolysable, they are **moisture cured** (i.e., cross-linked) in the presence of a silanol condensation catalyst. See col. 6, lines 41-59. Moisture curing is a well-known technique to **crosslink polymers** and not couple particles with the polymer. Once again, Applicants direct the Examiner's attention to an article previously presented to the Examiner: A Review of Fifteen Years Development in Moisture Curable

Copolymers and a Future Outlook, http://www.borealisgroup.com/public/pdf/customercentre/WC_Mumbai2002_Visico.pdf (courtesy copy submitted), which discloses that Sonoda et al.'s process at col. 6, lines 28-56 is well-known to create crosslinking in copolymers not between particles and polymers.

This stands in stark contrast to Applicants' claims that require the hydrolyzable organic silane groups be used to compatibilize the polymer with the natural magnesium hydroxide. In other words, the silanes of Sonoda et al. create bonds between the polymers and not between the polymer and natural magnesium hydroxide. This distinction is further evidenced in Sonoda et al. by its teachings regarding grafting the anhydride to the polymer. This is also seen in U.S. Patent No. 5,139,875, cited by the Examiner, which as discussed below, distinguishes between coupling particle/polymer (i.e., compatibilization) and cross-linking.

The Office is incorrect when it asserts that Applicants have merely claimed a property inherent to the silanes. See Office Action at 12. First, it is well-established that the mere presence of a component does not mean it will inherently function as Applicants' claim, i.e., to compatibilize particle and polymer. See Ex Parte Schricker, 56 U.S.P.Q.2d 1723, 1725 (Bd. Pat. App. & Int. 2000).

Second, contrary to the Office's assertion (page 13 of Office Action), Betso et al. teaches that compatibilization of particle and polymer is not an inherent property of the silanes. It is only one of four possibilities. Col. 10, lines 42-58. As the Applicants had pointed out in their September 10, 2003 Response, inherency "may **not be established by probabilities or possibilities**. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." See M.P.E.P. § 2112 (citing In re

Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)). Thus, to be an evidence of record that establishes inherency, the result or characteristic must necessarily be present in the prior art to establish the inherency of that result or characteristic. See M.P.E.P. § 2112 (citing In re Rijckaert, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993)). Not a one in four chance.

Third, Sonoda et al. teaches grafting anhydrides to the polymer. These anhydrides act as the coupler between the polymer and particle, as explained in Dupont Industrial Polymers: Fusabond® (courtesy copy previously submitted). In fact, as explained in Applicants' specification, the anhydride are more reactive, and thus, would couple before the silanes had the opportunity. Specification at 6, lines 27-30. This is consistent with Betso et al., which teaches that the presence of other components will determine what kind of coupling (particle/polymer, or polymer/ polymer, etc.) occurs with respect to the silanes. Col. 10, lines 59-61.

C. Sonoda et al. does not teach the no appreciable cross-linking limitation

There is only one instance where Sonoda et al. teaches the use of organosilanes with respect to the polymers; however, it is for the sole purpose of moisture curing. Col. 6, lines 41-42. Sonoda et al. details how once the polymer has been made hydrolysable, they are **moisture cured** (i.e., cross-linked) in the presence of a silanol condensation catalyst. See col. 6, lines 41-59. A Review of Fifteen Years Development in Moisture Curable Copolymers and a Future Outlook, http://www.borealisgroup.com/public/pdf/customer_centre/WC_Mumbai2002_Visico.pdf, explains that Sonoda et al.'s moisture curing process at col. 6, lines 28-56 is a well-known method to create crosslinking in copolymers. Accordingly, Sonoda et al. does not recognize the limitation

of "no appreciable cross-linking," and, in fact, teaches away from that limitation. For the foregoing reasons, Sonoda et al. does not expressly or inherently teach all the limitations of the claims. Thus, Sonoda et al. fails to anticipate the present claims and the present rejection should be withdrawn.²

III. Rejections Under 35 U.S.C. § 103

(A) The Office has rejected claims 16-30 under 35 U.S.C. § 103(a) as being unpatentable over Sonoda et al. as applied above to claims 16-30, in view of U.S. Patent No. 5,139,875 ("Metzemacher et al."), for the reasons given at pages 5-6 of the Office Action. Applicants respectfully traverse this rejection for at least the reasons presented below.

To establish a *prima facie* case of obviousness under 35 U.S.C. § 103, the Office bears the burden of establishing each of three requirements. First, the references must teach or suggest each and every element and limitation recited in the claims. See M.P.E.P. § 2143.03. Second, the Office must show that some suggestion or motivation exists, either in the reference itself, or in the knowledge generally available to one of ordinary skill in the art, to modify the references to achieve the presently claimed invention. See M.P.E.P. § 2143.01. Third, the Office must establish a reasonable expectation of success for the proposed combination. See M.P.E.P. § 2143.02. Each of these requirements must "be found in the prior art, and not be based on applicant's disclosure." M.P.E.P. § 2143. Moreover, deficiencies in the references cannot be cured by appealing to "common sense" and "basic knowledge" without any evidentiary support. In re Zurko, 258 F.3d 1379 (Fed. Cir. 2001). As discussed above, Sonoda et

² The Examiner has not addressed how Section 103 applied to Sonoda et al. alone;

al. fails to teach or suggest a flame-retardant coating/composition that contains (1) "natural magnesium hydroxide in an amount such as to impart flame-retardant properties," (2) "hydrolyzable organic silane groups grafted onto the polymer chain for compatibilization," or (3) "no appreciable cross-linking," as recited in the claims. Applicants incorporate by reference their arguments made above, as if recited herein in full.

Metzemacher et al. discloses different methods of surface-treating magnesium hydroxide particles, natural or synthetic, for incorporation of such particles into plastics. Col. 1, line 63 - col. 2, line 6. These particles may be surface treated with organosilane coupling agents. Col. 3, lines 19-27. Like Applicants, Metzemacher et al. recognizes the difference between coupling and crosslinking, when it distinguishes coupling agents from cross-linking agents. *Compare* col. 3, lines 19-27, *with* col. 3, lines 45-55. Metzemacher et al. discloses that its surface treated particles are suitable for flameproofing various polymers. Col. 4, lines 35-40.

1. Natural Magnesium Hydroxide

Applicants submit that the Office must establish some motivation to combine or modify the teachings of these references. The Office asserts that a motivation exists because of the utility of natural magnesium hydroxide. Office Action at 6. However, this is insufficient. First, the Office's argument merely establishes that the two references are analogous art. If that were all, then the Office could merely show the disclosure of all elements in a series of analogous references. Yet that is explicitly prohibited by M.P.E.P. § 2143.01, at 2100-126 (stating that references teach all aspects of the

Applicants will respond to that rejection when the rejection is made.

claimed invention is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings). Second, "[t]he fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish a *prima facie* case of obviousness." M.P.E.P. § 2143. In other words, the mere fact that the surface-modified magnesium hydroxide taught in Metzemacher et al., after incorporating it into an ethylene homopolymer, could be modified to form a flame-retardant coating for a self-extinguishing cable, does not make the modification obvious. The Office must offer a reason, known in the art, to use natural magnesium hydroxide as substitution for the particles of Sonoda et al. and Applicants' specification is unavailable for that purpose.

Applicants submit that the Office must establish some reasonable expectation of success for the proposed combination/modification. The Office asserts that a reasonable expectation of success exists without any analysis. Office Action at 6. On its face, this rejection is improper, because the Office provided only opinion and no recitation of facts. See M.P.E.P. 2144.03, at 2100-132 (citing In re Zurko 258 F.3d 1379, 1385 (Fed. Cir. 2001) ("With respect to core factual findings in a determination of patentability ... the Board cannot simply reach conclusions based on its own understanding or experience -- or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point to some concrete evidence in the record in support of these findings."))

Moreover, Applicants submit that there is no reasonable expectation of success. While Metzemacher et al. has a general disclosure of the use of its particles in polymers, that does not necessarily mean there is an expectation of success with

Applicants' polymers. In fact, Applicants' specification explains that it was known in the art that natural magnesium hydroxide has low affinity with polymers of low polarity such as used in the claims, and the impurities degrade the polymer. See specification at 2. It was Applicants who surprisingly discovered that natural magnesium hydroxide could be made compatible with the polymer when the polymer is grafted with hydrolyzable silane groups and there is no appreciable cross-linking.

2. Hydrolyzable organic silane groups

As discussed above and already incorporated by reference herein, Sonoda et al. only teaches the use of hydrolyzable organic silane groups for cross-linking and not compatibilization. Metzemacher et al. does not correct this deficiency. Metzemacher et al. does disclose organosilanes as coupling agents, but the **particles** are surface treated with these agents. See col. 3, lines 19-27. There is no disclosure of grafting these agents to the polymer.

The Office asserts a motivation to combine based on Metzemacher et al.'s disclosure of the coupling agents to ensure bonding between the particles and the polymer. Office Action at 6. The mere fact that a reference teaches one mechanism of compatibilization cannot be a motivation to combine references to meet a limitation directed to a wholly different mechanism. There is nothing in Metzemacher et al. that suggest the coupling agents may be grafted to the polymer, as required by all of the claims.

3. No Appreciable Cross-linking

As discussed above and already incorporated by reference herein, Sonoda et al. only teaches the use of hydrolyzable organic silane groups to achieve cross-linking

As stated above, 35 U.S.C. §103(c) states that prior art under §102(e) shall not preclude patentability of an invention if the invention was (1) developed by another person, and (2) commonly owned or subject to an obligation of assignment to the same person. U.S. Patent No. 6,552,112 meets both of these requirements of 35 U.S.C. §103(c), because Luca Castellani, one of the inventors of U.S. Patent No. 6,552,112, is not an inventor of the present application and is, therefore, "another person" or inventive entity in the eyes of the law.

Furthermore, the assignment of the present application is to Pirelli Cavi E Sistemi S.P.A., which is the same entity named as the assignee listed on the face of U.S. Patent No. 6,552,112, as required for 35 U.S.C. §103 (c). Applicants have confirmed that the present application and U.S. Patent No. 6,552,112 were, at the time the present invention was made, owned by, or subject to an obligation of assignment to, the same corporate entity, i.e., Pirelli Cavi E Sistemi S.P.A.

Therefore, 35 U.S.C. §103 (c) operates to remove Redondo et al. as prior art to the present application. M.P.E.P. § 706.02(I)(1).

IV. Conclusion

In view of the foregoing remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

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Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account no. 06-0916.

Respectfully submitted,

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